



E&TR Celebrates 20 Years

Reporting LLNL's Scientific and Technical Accomplishments

ENERGY and Technology Review celebrates its 20th anniversary this month as a public showcase for the quality and diversity of LLNL science and technology. LLNL's technical diversification in the late 1960s and early 1970s and the need to communicate with new programmatic sponsors were among the factors that led to *E&TR*'s creation.

"Today, a journal that brings the Laboratory's R&D expertise into focus for the scientific community, funding sponsors, and the public is even more essential," says retired Associate Director Carl Haussmann, who helped nurture *E&TR* during its formative and pre-teen years.

"There is such a wealth of competing information and, in some sense, competing institutions that



1975



1976



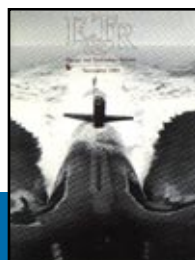
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1979



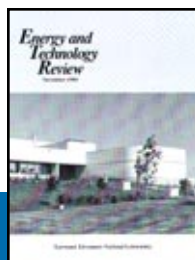
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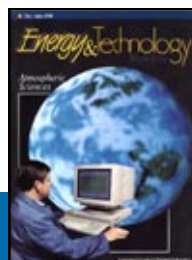
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1987



1989



1990



1994

you want to project your work as much as possible,” said Haussmann. “It also is important to get a reality check with the world; communicating your work to the public and private sectors is one way to do that.”

Agreeing with Haussmann is Bob Barker, assistant to the director and program manager of the LLNL’s Department of Defense activities. “As its customer base diversifies,” said Barker, “LLNL finds itself dealing with more people who don’t understand the breadth of the Laboratory’s capabilities.”

“*E&TR*’s broad coverage of the Lab’s technical capabilities provides an ideal mechanism for making new potential customers aware of what we could do,” said Barker, who has had the Director’s Office oversight responsibility for *E&TR* since 1993.

E&TR debuted in April 1975 to report on the Laboratory’s growing and relatively young programs—in energy, the environment, lasers, atmospheric sciences, and bioscience—that were added to the

Design Changes Over the Years

Make *E&TR* so visually appealing that a reader can’t resist wanting to read the articles: That has long been one of the primary marching orders for the graphics staff of *Energy & Technology Review*.

In response to that direction, *E&TR* has gone from a relatively staid black and white report to a journal that uses the most modern graphics tools to foster comprehension of LLNL’s scientific and technological accomplishments.

Instead of simply using author-provided photographs, graphs, and diagrams, the *E&TR* graphics staff often develop completely new illustrations or have photos taken that will help convey the author’s message.

Issues have featured 3-D computer graphics, illustrations of complex experiments not yet built, and even renderings of phenomena that cannot be seen by the human eye, as was the case in a recent article about an

astronomical experiment to detect massive compact halo objects, or MACHOS.

While use of color, cover design, and publication layout all evolved in response to each Scientific Editor’s preferences or goals, now-retired Associate Director Carl Haussmann was a key figure during the graphics makeover in the early 1980s.

“Carl was always interested in the appearance and quality of the report, and was always pushing for the use of color,” said Lyle Cox, who was a member of Haussmann’s staff at the time.

Haussmann said he wanted *E&TR* to successfully compete with other publications for a reader’s attention. “If the content of your document is good—and I thought the content of *E&TR* was already pretty good—then the name of the game is to have your document picked up because of its mode of presentation.”



(E&TR February 1976) Janus, LLNL's first two-arm laser system, consisted of a dye-mode-locked oscillator, preamplifiers, beam-shaping optics, and a series of neodymium-doped, glass disk amplifiers with optical isolators. Most components were the same as in our single-arm Cyclops system. This laser drove our first successful inertial confinement fusion experiments in 1974.

original missions of nuclear weapons R&D and magnetic fusion energy research.

The chief reporting vehicle prior to *E&TR*'s creation was a classified monthly report, *Research Monthly* (renamed *National Security Science and Technology Review* in 1993), that for nearly two decades had been prepared for the Atomic Energy Commission's (AEC's) Office of Military Application. Its focus was on the Lab's classified nuclear weapons research activities.

Research Monthly traces its roots to the LLNL monthly external progress report, first issued at the end of September 1952, the month the Laboratory opened. "That humble report consisted of nine typewritten pages, with nary a figure or table, and was stapled inside an ordinary file folder and hand-stamped with the appropriate classification markings," said Bob Berlo of the Technical Information Department (TID).

Berlo, who was a general editor on *Research Monthly* at the time *E&TR* was born, said copy for the classified report was written by Laboratory scientists and did not begin to receive extensive editing until 1964. By 1968, a team of two

to three TID editors was assigned to handle the growing publication. As the Lab's research mix changed in the 1970s, so did the classified monthly's content. On some occasions, half of *Research Monthly* contained unclassified articles.

Hausmann remembers a meeting in which Mort Mendelsohn, then head of Biomedical and Environmental Sciences, argued strongly for an unclassified companion to the classified journal. Said Hausmann: "It was clear that the director and the associate directors thought it was a good idea, so we proceeded."

The job of rounding up contributors for the first *E&TR* fell to Phil Coyle, then a young mechanical engineer who, in 1974, had been appointed to the term position of Scientific Editor for *Research Monthly*. Each Scientific Editor since Coyle has had responsibility for the scientific content of both the classified and unclassified journals.

Coyle was enthusiastic about the idea of an unclassified publication that publicly shared Laboratory science and technology, and "deserves a lot of the credit for *E&TR*'s creation," said Lyle Cox, who, along with Jim Frank, has been a central member of the Director's Office "monthlies" team. Coyle, as

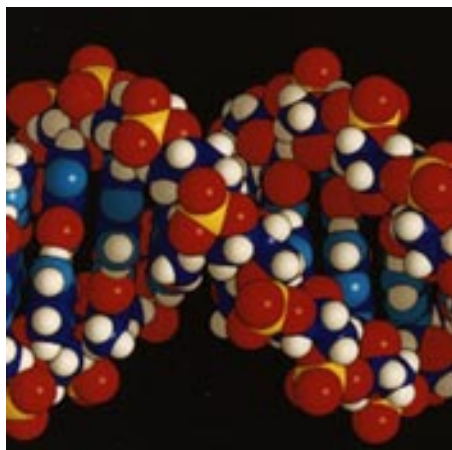
(E&TR November 1976) The lunar surface magnetometer deployed at the Apollo 16 landing site. The boot prints indicate scale. The golden ribbon is a power and signal cable. Together with an orbiting magnetometer aboard Explorer 35, this and other instruments provided a continuous record of changes in the magnetic field on the Moon over many months. (NASA Apollo photo.)



Principal Laboratory Associate Director, eventually inherited the *E&TR* and *Research Monthly* oversight roles from Haussmann. Coyle retired in 1993 and is now Director of Operational Test and Evaluation in the Office of the Secretary of Defense.

E&TR was oriented initially toward two audiences—the Laboratory itself (primarily the scientific and technical staff), and its new sponsoring agency, the Energy Research and Development Administration (ERDA, which was created to replace the AEC; the Department of Energy succeeded ERDA in 1977). An additional audience—the nation’s academic and industrial communities—was also expected to have a strong interest in the Laboratory’s technical achievements. Frank undertook the job of creating *E&TR*’s external distribution list. By the end of the second year, the list had grown to 370 individual recipients.

Articles in the first *E&TR* addressed research in astrophysics, lasers, and fossil, solar, and magnetic fusion energy. Titles ranged from “Shallow Solar Ponds: An Economic Approach to Industrial Process Heat” to “An Overview of the LLL *In Situ* Coal Gasification Program.”



The Laboratory’s “mirror reactor” approach to magnetic fusion energy discussed in the inaugural *E&TR* has since given way to an international effort focusing on tokamaks. “LLNL’s solar pond and coal gasification research, both of which were continuing when *E&TR* celebrated its 10th anniversary, have developed into semicommercial projects,” said Bob Schock, acting Associate Director for Energy. “The Army installed solar ponds at one base, and several companies successfully implemented UCG (underground coal gasification). Both programs were very much ahead of their time and were victims of the falling price of oil as much as anything else.”

A reading of the *E&TR* index for 20 years reveals the history of other LLNL programs that continue to register technical achievements. The Laser Program is a good example. From the July 1975 article on “Progress in the Calculation of Laser-Plasma Coupling,” *E&TR* has tracked the evolution of inertial confinement fusion research, from Shiva to the planned National Ignition Facility. And it has followed the development of atomic vapor laser isotope separation, from concept



(*E&TR* July 1981) The “State of the Laboratory” issue illustrated the status of weapon designs for the U.S. stockpile. Here is shown one LLNL warhead project then under development. The W84 ground-launched cruise missile, authorized in October 1976, was in the production engineering phase.

(*E&TR* November 1981) Computer-graphic modeling of a double helix of 20 base pairs of DNA.

E&TR's Scientific Editors

Since *Research Monthly* has had scientific editors, beginning in 1960, the LLNL Director's Office has viewed appointment to the position as an opportunity to provide a "broadening experience" to a (usually) younger member of the Laboratory's technical staff—someone who displays potential for future leadership.

"If you look at the careers of the people who have held the job, you'll see they have benefited from the experience," said Carl Haussmann, Associate Director Emeritus. "It is one of the most notable opportunities at the Laboratory—being given the job of finding out what is going on, and making sure that it gets reported."

The list of scientific editors includes Director Bruce Tarter; Bob Barker, currently assistant to the Director; and retired Associate Director Phil Coyle, now Director of Operational Test and Evaluation in the Office of the Secretary of Defense.

The editorial tenures of Tarter and Barker came before the creation of *Energy and Technology Review*. Both filled the position during a period when the scientific editor focused his attention exclusively on the Laboratory's classified journal. Beginning with Coyle, the scientific editor was given responsibility for guiding the unclassified *Energy and Technology Review* and its classified companion.

For Ron Carr, *E&TR*'s second scientific editor, the greatest satisfaction during his tenure "was the opportunity to see many different parts of the Lab, and to learn a lot about the different programs and technologies."

Former scientific editors Stein Weissenberger (1980–81), Gordon Struble (1984–85) and Alan Burnham (1989–90) share Carr's views about the richness of the experience.

"The positive experience certainly, I think, outweighed the pain and heartache in pulling articles together," said Weissenberger, an electronics

engineer who now is a program co-leader in Transportation Technologies. "Clearly there could be no better way to get exposed to what was going on in the Lab. In that sense the job was extremely rewarding."

Said Struble, who at the time of his appointment was a Nuclear Chemistry group leader and is now deputy director of the Laboratory Directed Research and Development Program: "I came in with a very parochial view and learned a lot about the Laboratory."

Added Burnham, who was a member of Chemistry and Materials Science when he was tapped for the job: "I was struck by the vast diversity of high-quality work being done, and I'm convinced that no one even within the Lab truly understands all we are capable of doing." Burnham is currently a program leader in Energy Technology.

Although the Director customarily provides guidance to the scientific editor on the technical thrust of the journal, Tarter has displayed a much greater personal interest in *E&TR*, said Lyle Cox. "I think it is because he had a good experience himself as a scientific editor," Cox observed.

Since the 1960s, Cox and his associate, Jim Frank, have handled a variety of Director's Office assignments for the Laboratory's external publications. In 1984, both filled in on an interim basis after scientific editor Frank Morrison died in a traffic accident. Cox also has served as a Director's Office "scout" for candidates for the position of scientific editor.

In the late 1960s, said Cox, he was asked by Haussmann to handle the background work on prospects for the position of scientific editor. "Since then I've been doing the annual beating of the bushes for a potential editor. It has been an enjoyable experience. Many of these people have gone on to become division leaders, which was the original checkpoint."

Appointed by the Director, a scientific editor serves for a year to 18 months. In addition to selecting topics and convincing scientists to break away from their day-to-day bench assignments to write articles about their work, a scientific editor works closely with the TID publications team to scope out each issue and shepherds article reviews. Sometimes the scientific editor must arbitrate differences between authors and general editors.

"Normally the TID editors deal directly with the author over the details of editing," remembers Weissenberger. "But in one case the author was so demanding and difficult that I was brought into the process. It was one of those interesting life experiences where you discover how personality, science, and politics can complicate your life."

Carr recalls how he used to get busy scientists to write articles. "They always had some excuse as to why they couldn't make the schedule. So I would get information on the topic they were trying to write and do the article myself. Since I did not have the background for the article, it would be technically and every other way wrong—and I knew it. I would give the article to the 'author' and say I was going to print it as shown. This got an immediate response—and a good article."

Weissenberger said one of his "fondest memories" relates to his experiences with Cox and Frank during the Director's Office review cycle.

"Lyle and Jim have two completely different personalities, but between the two you can cover the various parts of the publishing process," Weissenberger said. "Lyle is infinitely patient and sensitive to high-level issues, whereas Jim is certainly one of the most meticulous readers I have ever known. You can always count on him to go over a paper or draft with a microscope."

to creation of an independent quasi-government corporation that will industrialize the technology. Also unfolded through the pages of *E&TR* has been LLNL's development of laser applications to the manufacture of integrated circuits.

E&TR's audiences have learned about Livermore bioscience developments in cell-sorting technology, the makeup of the human genome, and biotechnology. They have read about revolutions in microtechnology and microengineering, the significance of Livermore-developed materials such as aerogels and seagels, and the ways our R&D is helping the nation regain its once-dominant economic position.

E&TR also has provided readers who don't have authorized access to *National Security Science and Technology Review* (formerly *Research Monthly*) with an unclassified look at the Laboratory's achievements in the national defense arena. Articles have ranged from nuclear weapons R&D and techniques for verifying arms control treaties to emerging nuclear proliferation issues and post-Cold War nuclear weapons dismantlement activities.

E&TR introduced its first themed issue in August 1977 with an all-Laser Program edition. Later

dedicated issues focused on areas such as computer graphics, astrophysics, high-pressure physics, accelerator mass spectrometry, and materials by computer design. One focused issue has recurred annually, the State of the Laboratory edition.

Kent Johnson, the scientific editor from September 1990 to September 1991, said he was surprised by the popularity of two *E&TR* issues under his tenure that "walked one step away from direct scientific results" and addressed topics "that had a little more flair." One was a dedicated issue on the Laboratory's educational outreach activities; the other contained several articles on cold fusion, which reported negative results.

Since *E&TR*'s beginning, the scientific editor and the Laboratory Director, or his representative, have decided what areas of Livermore research should be featured in the journal. The scientific editor then solicits articles from members of the scientific and technical staff and works closely with *E&TR*'s publication team—Technical Information Department (TID) editors, writers, graphic designers, photographers, and other production team members.



(*E&TR* July–August 1989) The Rocky Mountain underground-coal-gasification test facility near Hanna, Wyoming. There we investigated ways to extract energy otherwise not exploitable. Coal was partially burned underground, and the gas produced could be upgraded to pipeline quality or used as a synthesis gas for liquid fuels.



(*E&TR* February 1985) The Nova target chamber, a massive aluminum sphere 4.6 m in diameter with walls almost 13 cm thick. The large flanges carry the frequency-conversion arrays and the final focusing lenses with their positioning mechanisms.

Ever ready with advice and enthusiasm (from left to right) Jim Frank, Carl Haussmann, and Lyle Cox have played an important role in *E&TR* since its beginning in 1975.



“It takes a considerable number of people to turn out these publications out,” said Haussmann. “There are a lot of in-the-trench workers, people whose behind-the-scenes efforts make these things happen. The TID people—publication editors, writers, designers—have been major contributors over the years. The quality of their work has been impressive.”

Helping an author shape an article into one that can be comprehended by people with dissimilar technical

E&TR's Scientific Editors: Where Are They Today?

Scientific editor	Editorial tenure	Current assignment
William A. Bookless	1994–present	Project Leader, Nuclear Weapons Information Project
William J. Quirk	1993–1994	Primary Design and Intelligence Analyst
Joseph A. Sefcik	1991–1993	Program Manager, A Division
Kent C. Johnson	1990–1991	Assistant Associate Director, Advanced Projects Office, Defense and Nuclear Technologies
Alan K. Burnham	1989–1990	Program Leader, Energy Technology Program
Andrew J. Poggio	1988–1989	Deputy Division Leader, Engineering Research Division
Richard D. Lear	1987–1988	Associate Program Leader, B Division
Hriar S. Cabayan	1986–1987	Manager, RF Weapons Effects Program
Gordon L. Struble	1984–1985	Deputy Director, Laboratory Directed Research and Development Program
Lyle A. Cox	1984	Staff to the Director
James Frank	1984	Physicist
Frank A. Morrison	1983–1984	Deceased 1984
Paul S. Brown	1982–1983	Assistant Associate Director for Arms Control, Defense, and Nuclear Technologies
Irving F. Stowers	1981–1982	Science and Technology Advisor, Energy, Materials, Transportation Technologies Program
Stein Weissenberger	1980–1981	Program Co-Leader, Transportation Technologies Energy Directorate
Erik Storm	1979–1980	Deputy Associate Director, Laser Programs
Robert C. Haight	1978–1979	Technical Staff Member, Los Alamos National Laboratory
Henry D. Shay	1977–1978	Senior Staff, Computation Organization
Robert W. Selden	1976–1977	Assoc. Director of Lab Development (ret.), Los Alamos National Laboratory
Ronald B. Carr	1975–1976	ME Division Leader for Laser Program (ret.); now Lab Associate serving DoD Office of the Secretary of Defense
Philip E. Coyle	1974–1975	Director of Operational Test and Evaluation, Office of the Secretary of Defense

Editor's note: Scientific Editors also have responsibility for *E&TR*'s classified companion, *National Security Science and Technology Review*. Scientific Editors before the debut of *E&TR* were: V. Alan Mode, 1973; C. Bruce Tarter, 1972; Robert B. Barker, 1971; George G. Staehle, 1970; Jim Kane, 1969; Richard Wagner, 1968; Van Hudson, 1967; George F. Bing, 1966; Bill Grayson, 1966; John W. Kury, 1965; Russ Duff, 1964; Harlan Zodtner, 1960–1963.

backgrounds can turn into a demanding assignment, say scientific and general editors. Some authors, the editors say, are reluctant to have their writing red-penciled, feeling the editing process might—as Johnson puts it—“dumb down their work.”

TID editor Lauren de Vore, an *E&TR* editor from 1980 to 1994, tells the story of one colleague who worked with a scientist who was “painstakingly helpful during the writing and editing process, but was



(E&TR November 1989)
The Laboratory's High Explosives Applications Facility's (HEAF's) cylindrical steel containment vessel, 3.6 m in diameter and 12 m long, shown prior to installation. It is used in experiments with a 100-mm-bore gun and for detonations of up to 5 kg of high explosives (TNT equivalent), but will be upgraded to withstand detonations of up to 10 kg.

Bruce Tarter on *E&TR*'s 20th Anniversary



C. Bruce Tarter
Director

For two decades, *Energy and Technology Review* has played a vital communication role for the Laboratory. By reporting on the Laboratory's scientific and technological accomplishments, *E&TR* has helped its audience foster an understanding of the significance of our R&D contributions to the nation and the world.

Before *E&TR*'s creation, the Laboratory reported monthly to the Atomic Energy Commission through what evolved into the classified journal, *Research Monthly* (renamed *National Security Science and Technology Review* in 1993). The focus of *Research Monthly*, for which I had the pleasure to serve as Scientific Editor in 1972, was on the Laboratory's classified defense activities. In April 1975, *E&TR* debuted as *Research Monthly*'s unclassified companion, addressing growing programs in energy, biomedicine, and the environment, and the unclassified elements of the nuclear weapons program.

Significantly, the birth of *E&TR* came amidst a time of change, one similar to what we are experiencing today. New avenues of communication were required in the 1970s, necessitated in part by Congress' decision to abolish the AEC and create the Energy Research and Development Administration (itself replaced by the Department of Energy in 1977). For us at the Lab, that meant making our capabilities known to many people who were not intimately familiar with our record of technical success and R&D contributions to the nation—program people who joined ERDA from other

organizations and Congressional representatives on new oversight committees.

Today, *E&TR* provides a communication link with greater significance between the Laboratory and the outside world. We find ourselves interacting with an even wider spectrum of individuals and organizations who are not well acquainted with LLNL and the other DOE laboratories. Those in this category include the new Congressional leadership and their staffs; employees of federal, state, and local organizations with whom we have growing interactions; representatives of industry and consortia seeking to partner in areas of mutual benefit; and members of the general public who are curious about the role that national laboratories, particularly those with historically defense missions, can play in the post-Cold War world.

The Laboratory is committed to ensuring that we provide these new audiences with an understanding of what the Laboratory does and why. As part of this commitment, we have been looking at ways to position the publication for an even stronger communication role. We have taken two steps to further the commitment. First, we decided to rename the journal *Science and Technology Review* (*S&TR*) to better reflect the Laboratory's current mission. Second, we are implementing improvements that range from new features and special sections on Lab science and technology to increase the journal's accessibility by making it available on the Internet. These changes will occur in the July issue, after a two-month publication hiatus. We are confident that *S&TR* will have a bright future: *E&TR* paved the way.



(E&TR July 1992) Effective, rapid removal of underground hydrocarbon spills can be done with dynamic underground stripping. Workers are drilling a steam injection and electrical heating test well that will be used for controlled extraction of contaminants and associated groundwater from spills such as a leaking diesel fuel tank.

never quite pleased. The author/scientist indicated that because the article was so clear and readily understandable, he felt like we had trivialized his life's work," said de Vore.

"Most authors I have run across think they need no help whatsoever initially," said Haussmann, talking about reaction to the TID editing support and the pre-publication Director's Office review. "My suspicion is that when they (the authors) are done, they realize they benefited from the process."

As Haussmann sees it, the payoff to the author—and the Laboratory—is more than having a scientifically accurate, technically defensible article that can be understood by a wide spectrum of readers. The *E&TR* editing and review process also helps scientists develop into well-rounded communicators—a skill that has become increasingly valuable in an era when science is under close scrutiny from the public and Congress and explanation becomes a way of life.

During the 1970s and early to mid-1980s, articles tended to be fairly short (four to six pages). In the late 1980s and early 1990s, they typically

ran 10 to 12 pages, as more explanatory material and detailed illustrations were added so readers could understand more fully the significance of the accomplishment. Today, however, articles are shorter and more sharply focused to accommodate *E&TR*'s interested, educated, but non-expert readers who say they are too busy to spend time reading lengthy articles.

Electronic publishing is an additional feature for the technically rigorous reader who demands detail. As the Information Superhighway matures and extends its reach, *E&TR* will also be published electronically. Soon, in fact, *E&TR* readers will be able to click onto electronic links that will access an article's references to supporting documents, illustrations, and videos.

"When we do that, the whole world can tap into *E&TR* if they want. It will become available to everybody," explained Haussmann, who, although retired, maintains a fatherly interest in the publication he helped launch. Observed Haussmann: "In this era of greatly increased information flow, *E&TR*, both in paper and electronic form, has the potential of having more impact than ever."

(E&TR April-May 1992) A flow sorter designed and built at LLNL for high-speed sorting of human chromosomes in our Human Genome Center. This sorter features three lasers, state-of-the-art optics, and the latest computer technology, which together produce a versatile and powerful research tool for measuring the level of genetic injury in human cells.

